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He (the Chairman) agreed with Sir Roderick Murchison in all his observations. The story told by the men was a very lame one as it stood at present, and ought not to be accepted without verification. At the same time, it was ominous that it was now eight or nine months since the assassination was said to have taken place, and no despatch had been received contradicting it. In the mean time, all that could be done was, to have patience and await the result. He (the Chairman) was sure that they would all feel that, if Dr. Livingstone had perished, not only had science sustained an irreparable loss, but that almost every Fellow of the Royal Geographical Society had lost a personal friend.

The following Papers were read :—

1. *The Delta and Mouths of the Amu Daria, or Oxus.* By Admiral A. BOUTAKOFF.

THE paper gave an account of the exploration which the author undertook of the mouths of the Oxus in two expeditions, the first in 1848-9, and the second in 1858-9. The river first begins to bifurcate in lat.  $42^{\circ} 12'$  and long.  $60^{\circ} 15'$  E. of Greenwich. This is the head of the Delta, the central portion of which forms a sort of depression into which the waters of all the branches, excepting the westernmost (the Laudan), empty themselves in a series of lakes more or less overgrown with reeds. The mouth of the Laudan has a depth of  $1\frac{1}{4}$  to  $1\frac{1}{2}$  foot only across the bar. The eastern arm, which limits the Delta, is called the Kuvan-Djarma, or Kuk (Blue) River, and, towards the sea, the Yangy Su (New River). In 1848-9 the principal mass of the waters of the Oxus was discharged through this branch, so that at  $9\frac{1}{2}$  miles from the mouth the expeditionary party drew fresh water from over the side of the vessel. In 1859, on the contrary, the Aral was quite salt close up to the mouth of the Yangy Su. The author, in September, 1859, ascended this channel, and at  $22\frac{2}{3}$  miles found the navigation arrested by a rocky ridge extending right across its bed, over which the water was only from  $1\frac{1}{2}$  to  $2\frac{1}{4}$  feet. He was compelled, in consequence, to leave behind his principal vessel, a steamer of 40-horse power, and to continue the survey in an open steamer of 12-horse power, with a crew of 18 men. The breadth of the channel further up was from 50 to 80 fathoms, and the depth 5, 6, 7, and 8 feet. After throwing off this easterly arm, the Amu Daria flows to the n.w. and n., continually emitting small branches and one larger channel, the Karabaili, which spreads out over the depressions, out of which it afterwards runs off into the one common channel of the Ulkun Daria (Great River) the branch by which the greatest quantity of water now finds its way to the Aral. West of the Ulkun is the Taldyk mouth, which had, in 1848-9, a very rapid current, with a depth of 3 feet on the bar, but which had lessened to  $1\frac{1}{4}$  and  $1\frac{1}{2}$  foot in 1858. The fortified town of Kungraad,

on the left bank of the Amu Daria, numbers from 6000 to 8000 inhabitants, consisting of Uzbegs, Sarts, Kirghizes, and Karakalpaks. The author, in surveying the various mouths, was often watched by armed Khivans on the banks, but no serious resistance was offered to his operations.

The paper will be printed entire, with a map, in the 'Journal,' vol. xxxvii.

The CHAIRMAN said that he remembered the time, and it was only twenty-five years ago, when the report that a Russian steamer had entered the Oxus would have caused a sensation of alarm from one end of India to the other. He was happy to say that such was not the case now. The public both in India and England looked with perfect complacency, and even with gratification, on the advance which the Russian Government had been making in prosecuting geographical knowledge through Central Asia. It was the especial happiness of the Geographical Society that, apart from all political considerations, it could yield a hearty tribute of admiration and applause to any nation and to any individual who contributed to the extension of geographical science. The paper of Admiral Boutakoff was one of very great geographical interest. It furnished precise information on many points with regard to which we were absolutely ignorant before. No astronomical observation had been ever previously taken at the mouth of the Oxus, nor had we known anything of the delta of that river. Admiral Boutakoff, however, was already well known in Russia for his extensive and successful exploration of the other great river of Central Asia—the Syr Daria or Jaxartes, which also fell into the Aral Sea. He had, indeed, conducted a steamer for above a thousand miles up the Jaxartes; a geographical feat which would live in history.

Now there were certain points connected with the rivers Oxus and Jaxartes which he (the Chairman) proposed to bring prominently before the Meeting. They referred to a physical phenomenon which he believed was without parallel in the rest of the world, being, indeed, neither more nor less than the drying up at certain periods of history of the Sea of Aral, and its consequent disappearance from the map of Asia. The Aral, in terrestrial geography, might be compared with one of the variable stars in astronomy. As there were stars varying from the first to the fifth magnitude, so the Aral was at times a great inland sea 300 or 400 miles in length, at other times a mere reedy marsh, and even, occasionally, a hard desert land, so that travellers actually passed across it without being aware that they were travelling over the bed of a sea. Humboldt had devoted 200 pages of his famous work 'Asie Centrale' to the discussion of the geography of the Aral and the Caspian, and he had established beyond dispute that the Oxus had a variable course, sometimes falling into one sea and sometimes into the other; but he had not ventured to assert that the Aral ever disappeared altogether. Nevertheless, he (the Chairman) maintained that we had direct evidence of the fact in modern times, and he thought we had a right to assume its occurrence in ancient times.

The argument was briefly as follows: In all classical antiquity, from the earliest date, say from 600 years B.C. to 500 or 600 years after Christ—the Sea of Aral was utterly unknown in geography. There was not one single authority—Greek, Latin, or native Persian—who mentioned it. The two great rivers, the Oxus and the Jaxartes, which, by their contributions now form that sea, were described by all authors as falling into the Caspian. It must be remembered, too, that Alexander the Great conducted an army into that part of Asia, and employed officers for the express purpose of ascer-

taining the geographical configuration of the neighbouring countries. He sent his troops on an expedition along the shores of the Caspian, while he in person crossed the Oxus, and reached the banks of the Jaxartes. Hence he must have possessed accurate information as to those localities, and yet the account which his officers brought back to Greece was that both the rivers fell into the Caspian. This statement, indeed, was adhered to throughout antiquity, and a practical proof was given of its truth in the notice of the line of commerce which supplied Europe with the products of Asia. This commercial route was described as starting from the foot of the Indian Caucasus, following the Oxus down to the Caspian, ascending the Kur or Cyrus, and descending the Phasis into the Black Sea, and thence crossing into Europe. We had thus direct evidence, as it seemed, that in the days when this route was followed and described, the Oxus must have fallen into the Caspian.

The Chairman went on to say, that as the present Sea of Aral filled an inconsiderable depression in the table-land of Central Asia, having no springs, and being entirely dependent for its supply on the two great rivers already mentioned, so it followed that if those rivers at any time were diverted from the Aral, the sea would necessarily become desiccated in a very few years, and the bed of it would revert to its original condition of a mere depression in the desert. The levels were a very important element in considering this question. That of the Aral was 117 feet above the level of the Caspian, and 33 feet above the Black Sea, the Caspian itself being 84 feet below the Black Sea; so that if a communication were formed between the Aral and the Caspian, the Aral would naturally drain off into the lower basin. To proceed, however, with the argument. If, in the times of classic antiquity, there was a unanimity of evidence that the Oxus and Jaxartes flowed into the Caspian, so, from the beginning of the Mohammedan era, say from the year 600 to about 1300, or for a period of seven hundred years, there was an equal unanimity exactly the other way. During this period the Arabs and their political successors were in possession of the country. They were a literary and scientific people, and wrote numerous works on geography. They possessed the means of ascertaining full topographical details, and they invariably represented the two rivers as falling into the Sea of Aral, or the Lake of Kharesm, as it was then usually called. The only reasonable inference then seemed to be, that between the years 500 and 600 the course of the two rivers, owing to some natural disturbance, must have changed, and that, instead of continuing to fall into the Caspian, they became diverted into the sea of Aral, themselves, in fact forming that sea. Now came the most curious part of the question. From about the year A.D. 1300 to 1500, that is, for about 200 years, Europeans possessed means of becoming acquainted with the geography of Central Asia which had never been equalled up to the present day; for there were at that time frequent missions sent from the courts of Europe to Mongolia in Central Asia, and the ambassadors so employed had for the most part preserved records of their journeys. Colonel Yule, an associate of the Geographical Society, had recently brought a general summary of those records before the notice of the public in a most interesting work ('Cathay and the Way Thither'), of which he (the Chairman) could not speak too highly, and which he could not too strongly recommend to the notice of all lovers of geographical science. Colonel Yule's book contained records of many travels across Central Asia during the 13th and 14th centuries, and in not one of those records was the Aral mentioned, although the route of the travellers lay in most cases exactly across it. One of the authors in question, named Pegoletti, gave all the details of the commercial route at that time, which conducted from the Black Sea to China, and along which merchants conveyed the luxuries of Europe, and

returned with the tea and silk of China. There were, indeed, detailed notices of the route in question, not only in the itineraries of Pegoletti, but in the maps which were constructed from memoranda furnished by travellers between the 13th and 16th centuries. One of these was called the Catalan Map; another was a map preserved in the Palatino Library at Florence; another was the Borgian Map, and the most famous of all was the Venetian map of Saint Mauro; and in none of these was the Aral noticed. The travellers came in the first instance from the Volga to Sarachak, on the eastern shore of the Caspian; and from thence they passed to Otrar, on the Jaxartes, the route lying across the bed of the Aral, which, nevertheless, in no single instance was either mentioned in the itineraries or laid down in the maps. On these negative grounds alone he should consider it quite certain that at that time the Aral did not exist, but we had fortunately positive evidence to confirm that conclusion.

Probably some of those present had heard of a very famous man called Yar Mahomed Khan, who was chief of Herat, during the period of the Afghan war about twenty-five years ago. This person had sent to him (the Chairman) during the war, as a token of friendship, a Persian manuscript, which seemed to be of very great value on account of its rarity. It was a work written by an officer of the famous ruler of Herat, Shah Rukh Sultan, and contained, amongst other matters, a geographical account of the province of Khorassan about the year 1418. The writer seemed to have been a minister of the country, and evidently knew every village and stream in the province. He (the Chairman) had made three extracts from the manuscript, which he considered to be of the utmost importance, as they recorded a physical phenomenon, namely, the desiccation of the Aral, which he believed had never up to the present time been brought to the notice of the geographers of Europe, although, as before stated, the great Humboldt had devoted no fewer than 200 pages of his standard work to the discussion of this subject. In describing the lakes of Asia the writer came in regular order to the Aral, which was called the Lake of Kharesm, and he said, "In all the ancient books the Lake of Kharesm is described as the receptacle of the waters of the Oxus, but at the present date, which is A.H. 820 (A.D. 1417), the lake no longer exists, the Jyhún (or Oxus) having made a way for itself to the Caspian, into which it disembogues at a spot called Karlawn, as will be described hereafter in its proper place." Again, in describing the rivers of Asia, he said, "It is recorded in all the ancient books that from this point the River Jyhún (or Oxus) flows on and disembogues into the sea of Kharesm; but at the present day this sea no longer exists, the river having made for itself a new channel, which conducts its waters into the Caspian. The point of embouchure is named indifferently Karlawn and Akrichéh. From Kharesm to the point where the river falls into the Caspian the greater part of the country is desert."

So much for the Oxus. With regard to the Jaxartes, this writer explained another point which was of some importance; for, although the Oxus might have been diverted into the Caspian, still, if the other river entered the Aral, it would still remain a sea. But it was stated as follows:—"The river of Khojend in the lower part of its course, passing into the desert of Kharesm, joins the Jyhún (or Oxus), and thus ultimately reaches the Caspian." From which passage he (the Chairman) understood that at that time, A.D. 1417, the Jaxartes below Otrar branched off from its present bed to the left hand along a line now marked by reeds and lagoons (see Meyendorf's map), and joined the Oxus between Kungrad and Khiva, the two rivers from that point flowing on to the Caspian in one and the same bed. This statement was of the more importance as it came from a writer thoroughly acquainted with the country. In addition to this, there was the testimony of the great Emperor Baber, who

of course knew the geography of his own country, and who said that the Jaxartes in his time did not enter the Aral, but was lost in the desert. His (the Chairman's) belief was that it sometimes reached the Oxus, and was sometimes evaporated in the desert.

Such is the history of the Oxus and Jaxartes up to about the year 1500. From that time a second change began to take place. The rivers were then found to be going back into the Aral. It might not be generally known that Mr. Anthony Jenkinson, the agent of some English merchants, passed across Central Asia to Bokhara as early as 1550. He landed on the shore of the Caspian at Ming-kishlag, and came down the coast to a point where, as he heard, the Oxus had formerly disengaged into the sea; but he was told that the river had lately changed its course and gone back into the Sea of Aral. The ruler of the country, Abul-Ghazi Khan, who had left a most elaborate history of it, gave distinct details of this occurrence, and mentioned the very year in which the river began to return into the Aral. He related how the stream gradually dried up, and formed the sea as it at present exists. Evidence indeed could be given of the condition of the stream, almost year by year, from that time to the present; but it would be sufficient to state that every modern traveller who had passed through those regions had found the old bed of the River Oxus exactly where it was originally described. It was first brought to our notice by Mouravieff, a Russian agent, who passed from the Balkan bay to Khiva in 1819. Subsequently Arthur Conolly, who was afterwards murdered at Bokhara, attempted to cross from Astrachan to Khiva, and he also came upon the old bed; and lastly Mr. Vámbéry, whom the Fellows might remember seeing at a meeting of the Society two years ago, in his famous journey across the Turkoman desert, traced the same broad river-bed, and found that it was perfectly well known as the ancient bed of the Oxus. Hence it seemed that there was sufficient evidence to show that in early times, say from the year 500 before the Christian era to the year 600 after the Christian era, both the rivers ran into the Caspian, the Aral being non-existent; that after that, up to the year 1300, they fell into the Aral; that for the next two hundred years—namely, from 1300 to 1500—they came back into the Caspian; and that then, at a fourth stage, they gradually flowed back into the Aral, and formed the sea as we now know it.

The changes thus noticed were very important in reference to what might be the future history of these rivers and these countries. It was quite certain that, as the Jaxartes was now in the possession of Russia, so the Oxus must also naturally and necessarily be, in the course of time. Now he would read what was stated by Russian writers as the probable result of that event. The Russians almost always called these rivers by the names of the Amu Daria and the Syr Daria, instead of the Oxus and the Jaxartes; but he would, in reading the extract, use the latter names as being better known:—

"The Oxus is, for many reasons, of greater importance to Russia than even the Jaxartes. It disengaged at one period into the Caspian, and its bed to that sea still remains. Some are of opinion that the course of the river can be again directed to its ancient bed, while others consider it impossible to do so. It can, however, be positively asserted that the existing information on this point is very superficial and inaccurate, and the question will never be satisfactorily settled until a scientific expedition be sent by the Government to investigate it in all its bearings. The south-eastern shores of the Sea of Aral are well adapted for uniting the Jaxartes with the Oxus, and encourage the hope that the united mass of water of two such great streams may force their way through the old bed to the Caspian. The importance of this connexion will readily be understood, when it is remembered that a water-route in continuation of the Volga will be thus created, which will extend for

3000 versts into the interior of Asia, and that the extreme points of this uninterrupted water-way will be St. Petersburg and the northern slopes of the Hindoo Koosh."

This was a result which he (the Chairman) considered highly probable, and he believed that many present at the meeting would live to see a direct water-communication from the Baltic to the vicinity of the Indian Caucasus, which was considered the natural geographical boundary of India. They must remember that already there was a direct water-communication from the Neva, by means of canals, to Lake Ladoga, and thence to the upper course of the Volga, and down that river to the Caspian. Then, crossing the Caspian, vessels could reach the mouth of the bed of the Oxus. He looked upon that prospect without any apprehension or dismay, regarding it as the natural extension of civilization, and believing that it would be for the general advantage of mankind. Sir Roderick Murchison had often observed from that Chair that the Fellows of the Society assembled for the discussion of geographical and not political questions: but he (Sir H. Rawlinson) could not avoid saying that he did not look with any apprehension on the opening of this water-communication; and he was very glad to find that Russian officers were able to help English geographers towards a more thorough knowledge of the geography of Central Asia. They were gratified that evening by the presence of the brother of Admiral Boutakoff, the author of the paper, and he hoped he would say a few words on the subject of the expedition.

Admiral BOUTAKOFF said that it afforded him the greatest pleasure to have heard the terms in which the Chairman had spoken of his brother's efforts in furthering the science of Geography. It would certainly be one of Admiral Boutakoff's greatest rewards for the trouble he had taken in the survey that this Society felt interested in his researches.

Lord STRANGFORD advocated the uniform use of the names "Oxus" and "Jaxartes," and the other classical names for the rivers of Asia, in preference to the vernacular terms adopted by the Russians, such as "Amu Daria" and "Syr Daria." He also held up as highly worthy of imitation the combination of scientific life with practical life which had been made by Sir Henry Rawlinson while engaged in the public service in the heart of Central Asia. Such a combination was quite unique.

Admiral OMMANNEY asked whether Admiral Boutakoff communicated any information regarding the soundings of the Aral, for the absence of any depression in the middle of the Sea of Aral would bear out all that the chairman had stated.

Admiral BOUTAKOFF said he could not recollect what the soundings were, but he could state that they had been published in the charts that had been made from his brother's survey.

The CHAIRMAN said that a translation of Admiral Boutakoff's original survey of the Sea of Aral was to be found in the Transactions of the Society, and in that account the soundings were given. The sea was shallow throughout. He believed that its elevation of 117 feet above the Caspian would allow sufficient fall, in a distance of 250 or 300 miles, to drain the water into the Caspian. They may have remarked that Admiral Boutakoff seldom found more than two or three feet of water on the bars at the mouths of the delta of the Oxus. This shallowness would of course prevent the entrance of any large vessel, but by means of dredging-machines a depth of two or three feet might be increased to a fathom or a fathom and a half, very much as was done in St. George's Channel, at the mouth of the Danube.

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